

Listing of the Claims

1-9. Canceled

10. (Currently amended) ~~A~~ The process of claim 99 ~~±~~ wherein the flame retardant composition includes ~~aqueous or non-aqueous liquid is an aqueous liquid, the one~~ or more flame retardant substances selected from the group consisting of ~~are~~ phosphoric acid, ~~halogen-free phosphoric acid derivatives, phosphonic~~ phosphoric acid, halogen-free phosphoric acid derivatives, ammonium polyphosphate, ammonia, ammonia phosphate, ammonium molybdate, ammonium borate, organophosphorus chemicals, melamine, melamine chemicals, intumescent chemicals, alumina trihydrate, urea, guanidine, dicyandiamide, ethyl urea, ethylamine, thiourea, diethylenediamine, ethylenediamine, brominated aromatic organic compounds or brominated cycloaliphatic organic compounds, ~~and the~~ ~~adhesion agent is a cross-linking binder or a polymer or copolymer of an ester of~~ ~~acrylic acid, methacrylic acid, a styrene butadiene copolymer, vinyl chloride,~~ ~~vinylidene chloride, vinyl acetate, acrylonitrile, an acrylamide or a polyurethane~~ ~~ester or ether.~~

11-13. Canceled

14. (Currently amended) ~~A~~ The process of claim 79 ~~6~~ wherein the substrates are filaments, microfibers or fibers.

15. (Currently amended) ~~A~~ The process of claim 91 ~~±4~~ wherein the substrates are fibers.

16-78. Canceled

79. (Currently amended) A process for applying a flame retardant composition to a first and second substrate having at least a 5 weight percent of non-thermoplastic material, the process comprising:

treating the first substrate in a first treatment vessel with the flame retardant composition which is free of dye or other contaminating agents;

transferring a first depleted ~~unused~~ portion of the flame retardant composition from the first treatment vessel to a second treatment vessel;

removing a first excess portion of the flame retardant composition from the first substrate;

drying the first substrate to a first desired moisture content;

treating the second substrate in a second treatment vessel with a flame retardant composition which includes the first depleted ~~excess~~ portion of the flame retardant composition;

transferring a second depleted ~~unused~~ portion of the flame retardant composition from the second treatment vessel to the first treatment vessel;

removing a second excess portion of the flame retardant composition from the second substrate; and

drying the second substrate to a second desired moisture content.

80. (Previously presented) The process of claim 79, further comprising forming the flame retardant composition by mixing a plurality of substances in a collection tank before treating the first substrate with the flame retardant composition .

81. (Previously presented) The process of claim 80 wherein mixing a plurality of substances includes:

mixing a flame retardant substance;

mixing a solvent compatible with the first and second substrates, the solvent having a quantity sufficient to mix the flame retardant substance; and

mixing an adhesion agent having a quantity sufficient to adhere the flame retardant substance to the first and second substrates.

82. (Previously presented) The process of claim 80, wherein mixing a plurality of substances further includes:

mixing at least one of a stability agent;

mixing a viscosity enhancing agent; and

mixing a wetting agent.

83. (Previously presented) The process of claim 80, further comprising transferring the first excess portion to the collection tank, after removing the first excess portion.

84. (Previously presented) The process of claim 80, further comprising transferring the second excess portion to the collection tank, after removing the second excess portion.

85. (Previously presented) The process of claim 79, further comprising:
rinsing the first substrate with a rinse liquid, after the step of removing the first excess portion of the flame retardant composition from the first substrate and before the step of treating the second substrate with the first excess portion of the flame retardant composition; and

removing an excess rinse liquid from the first substrate, after the step of rinsing the first substrate and before the step of treating the second substrate with the first excess portion of the flame retardant composition.

86. (Previously presented) The process of claim 85, wherein rinsing the first substrate includes spraying the rinse liquid onto the first substrate.

87. (Previously presented) The process of claim 79, wherein removing a first excess portion of the flame retardant composition from the first substrate includes using a centrifugation technique.

88. (Previously presented) The process of claim 79, wherein removing a first excess portion of the flame retardant composition from the first substrate includes squeezing the first substrate between two rollers.

89. (Previously presented) The process of claim 79, wherein removing a first excess portion of the flame retardant composition from the first substrate includes

using a centrifugation technique.

90. (Previously presented) The process of claim 79, wherein removing a second excess portion of the flame retardant composition from the second substrate includes squeezing the second substrate between two rollers.

91. (Currently amended) A process for rendering substrates flame retardant, comprising the steps of:

applying a flame retardant composition to a substrate in a first vessel;

recovering excess ~~a portion of said~~ flame retardant composition which is not applied to said substrate during said applying step, said excess ~~portion of said~~ flame retardant composition being undiluted by rinse liquid and being free of dye or other contaminants;

combining said excess flame retardant composition recovered in said recovering step with one or more substances to produce a flame retardant composition which has weight percents of constituents which is the same or approximately the same as said flame retardant composition used in said applying step; and

~~drying said substrate to a desired moisture content; and~~

re-using said excess ~~portion of said~~ flame retardant composition by application to said substrate or another substrate.

92. (Currently amended) The process of claim 91 wherein said recovering step includes the step of physically separating a portion of said excess flame retardant composition from said substrate.

93. (Previously presented) The process of claim 92 wherein said physically separating step is achieved using at least one centrifuge.

94. (Previously presented) The process of claim 92 wherein said physically separating step is achieved by squeezing said substrate through mechanical rollers.

95. (Currently amended) The process of claim 91 wherein said recovering step includes the steps of

transferring ~~depleted a first amount of said~~ portion of said flame retardant composition ~~that is free flowing from said~~ a first vessel in which said applying step is performed after said step of applying to a second vessel; and

physically separating ~~a second amount of said excess~~ flame retardant composition from said substrate after said step of transferring.

96. (Previously presenting) The process of claim 95 wherein said physically separating step is performed in a third vessel.

97. (Previously presented) The process of claim 96 wherein said physically separating step is performed with at least one centrifuge.

98. (Previously presented) The process of claim 91 wherein said applying step impregnates said flame retardant composition into said substrate.

99. (Currently amended) A process for rendering fibers ~~substrates~~ flame retardant, comprising the steps of:

applying a flame retardant composition to a plurality of fibers ~~first substrate~~ in a first vessel and to a plurality of fibers ~~second substrate~~ in a second vessel;

recovering ~~a first portion of said excess~~ flame retardant composition which is not applied to said plurality of fibers in said first vessel ~~first substrate~~ from said first vessel, and ~~excess a second portion of said~~ flame retardant composition which is not applied to said plurality of fibers in said second vessel ~~second substrate~~ from said second vessel, said ~~first and second portions of excess~~ said flame retardant composition recovered during said recovering step being undiluted by rinse liquid and being free of dye or other contaminants;

drying said first and second substrates; and

re-using said ~~excess first and second portions of said~~ flame retardant composition by transferring portions of said excess flame retardant composition

obtained from said first vessel to said second vessel and portions of said excess flame retardant composition from said second vessel to said first vessel ~~a first amount of said first portion to said second vessel and a first amount of said second portion to said first vessel for applying said flame retardant composition to a plurality of fibers respectively positioned in said first and second vessels~~ said first or second substrates or one or more additional substrates, whereby said flame retardant composition used in said second vessel contains at least a portion of said flame retardant composition recovered from said first vessel which is undiluted by rinse liquid and is free of dye or other contaminants, and said flame retardant composition used in said first vessel contains at least a portion of said flame retardant composition recovered from said second vessel which is undiluted by rinse liquid and is free of dye or other contaminants.

100. (Currently amended) The process of claim 99 further comprising the step of removing at least one of said plurality of fibers from said first or second vessels, and wherein said recovering step includes the steps of

a) obtaining depleted flame retardant composition which is not absorbed by said plurality of fibers in either said first and second vessels and transferring said depleted flame retardant composition between said first and second vessels; and

b) further comprising the step of physically separating a second amount of said portion of said flame retardant composition from said plurality of fibers removed in said removing step and collecting said portion for re-use during said re-using step at least one of said first substrate and said second substrate.

101. (Currently amended) The process of claim 100 99 wherein said physically separating step is achieved using at least one centrifuge.

102. (New) The process of claim 100 wherein said re-using step including the step of combining said depleted flame retardant composition with a concentrated flame retardant composition in each of said first and second vessels.

103. (New) The process of claim 102 wherein said portion of said flame retardant composition which is physically separated and collected in step b) is used in said concentrated flame retardant composition.

104. (New) The process of claim 99 wherein said flame retardant composition includes one or more constituents at specified concentrations during said applying step, and wherein said re-using step includes the step of adjusting one or more constituents in said flame retardant composition to achieve said specified concentrations.

105. (New) The process of claim 99 wherein said applying step is performed under conditions sufficient to cause penetration of said flame retardant composition through a cross-section of individual fibers in said plurality of fibers.

106 (New) The process of claim 98 wherein said substrate includes a plurality of fibers.